

Daniel Harries – Curriculum Vitae

Personal

Current position: Visiting fellow, laboratory of physical and structural biology, NICHD, National Institutes of Health, Bethesda, Maryland, USA.

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Education

Post-doctoral research: Post-doctoral fellow, laboratory of physical and structural biology, chief: Dr. V.A. Parsegian, NICHD, NIH. Main research interest: Effect of solution conditions, crowding and osmotic stress on specific interactions between and within macromolecules.

Graduate Studies: Ph.D. Summa cum Laude, Hebrew University of Jerusalem, Israel, 2001. Dissertation Topic: Electrostatic interaction between macromolecules and mixed lipid membranes. Thesis Advisor: Prof. A. Ben-Shaul, Dept. of Physical Chemistry.

B.Sc.: Summa Cum Laude in Chemistry and honors program, Hebrew University, Jerusalem, Israel, 1995.

Military Service: Service commenced: 1988. Served in the Navy. Officers' course with distinction. Discharged: Lieutenant, 1992. Captain, 1997.

High school: Eylon High School, Holon, Israel.

Honors, Prizes and Scholarships

NIH visiting fellow award 2002-2004.

Rothschild fellowship, 2001.

Fulbright postdoctoral fellowship, 2001.

Ph.D. Summa cum Laude, 2001.

Clore scholarship, 1998.

Katzir scholarship, 1997.

Rector's prize for M.Sc. students 1996.

Wolf prize for M.Sc. students 1996.

B.Sc. Summa Cum Laude, 1995.

University scholarship for students in honors class, 1993-1995.

Dean's list 1994.

Dean's prize 1993.

Teaching

Teaching Assistant at *The Hebrew University of Jerusalem*, school of chemistry (April 1995-2001). Courses taught:

- Topics in statistical thermodynamics and phase transitions.
- Statistical thermodynamics for chemists.
- Physical chemistry: thermodynamics and kinetics.
- Electrostatics in biological systems, as part of course on Biophysics for neuroscience graduate students.
- Physical Chemistry, Laboratory.
- General chemistry.

Received letters from the Chemistry Department, commending teaching skills based on student survey, 1996, 1997, 2000.

In 2000, instructed in a workshop on training new teachers at the University (faculty of natural and exact sciences). Commended for this activity by the head of teaching for chemistry.

In 1997, advisor to a high-school student in a matriculation project on the topic “the possible connection between the 2nd law of thermodynamics and evolution”. The work has since been quoted in several educational publications.

Professional activities

- **Organized a 6-session symposium** on “Bio-colloids” at the 227th ACS meeting in Anaheim, CA, March 2004 (together with Drs. D. Danino and S. Wrenn). Also, guest editor (with Drs. Danino and Wrenn) for Macromolecular Symposia, issue devoted to symposium proceedings.
- **Served as peer-review referee** for: Biophysical Journal, Journal of Physical Chemistry B, Physical Review E, Langmuir, and Macromolecular symposia.
- **Member of:** The American Chemical Society; Biophysical society.
- October-November 1998: Attended, as an affiliate, a two-month workshop at the University of California Santa-Barbara, USA. The workshop topic was “Electrostatics in Biological systems”.
- August 1997 - Attended a four-week summer school on Biophysics at the University of California Santa-Barbara, USA.

Invited talks (since 2003)

- D. Harries, *Seeing the action of cosolutes on protein folding*, U. Maryland, college park, MD, 2003.
- D. Harries, *Consequences of osmotic stress to macromolecular association*, Hebrew U., Jerusalem, Israel, 2003.
- D. Harries, *Stressing macromolecules: Osmotic action on the nanometer scale*, U. of the Pacific, San-Francisco CA, 2004.
- D. Harries, *Consequences of osmotic stress on lipid-DNA complexes*, Polymer Networks 17th meeting, Bethesda MD, 2004.
- D. Harries, *Solutes probe hydration of nonpolar surfaces in association of cyclodextrin and adamantane*, 18th Gibbs meeting, Carbondale IL, 2004.
- D. Harries, *Osmotic stress on lipid-DNA complexes*, U. of Illinois at Urbana-Champaign, IL, 2004.
- D. Harries, *Electrostatic and elastic properties of lipid-macromolecule complexes*, U. of Vermont, VT, 2004.

Additional Presentations (since 2003)

- D. Harries, V.A. Parsegian, *Denaturation by co-solutes from a simple lattice model*, presented at the Biophysical meeting, San-Antonio TX, 2003.
- D. Harries, D. C. Rau, V. A. Parsegian, *Solutes probe the specific interaction of cyclodextrin and adamantane*, Presented at Gordon research conference on osmotic stress and cellular osmoregulation, Bristol RI, 2003.
- D. Harries, D. C. Rau, V. A. Parsegian, *Using cosolutes to probe the specific association of cyclodextrin and adamantane*, presented at the Biophysical meeting, Baltimore MD, 2004.
- H. I. Petrache, I. Kimchi, D. Harries, S. Tristram-Nagle, R. Podgornik, V. A. Parsegian, *Forces measured between neutral lipid bilayers swollen by monovalent salt*, presented at the Biophysical meeting, Baltimore MD, 2004.
- J. Yang, X. E. Cai, D. Harries, D. C. Rau, V. A. Parsegian, S. Cheley, H. Bayley *The interaction between alpha-hemolysin and egg-PC bilayers*, presented at the Biophysical meeting, Baltimore MD, 2004.

Publications

1. D. Harries and A. Ben-Shaul, *Conformational chain statistics in a model lipid bilayer: Comparison between mean field and Monte Carlo calculations*, J. Chem. Phys. **106**, 1609 (1997).
2. S. Y. Park, D. Harries and W. M. Gelbart, *Topological defects and the optimum size of DNA condensates*, Biophys. J. **75**, 714 (1997).
3. D. Harries, *Solving the Poisson-Boltzmann equation for two parallel cylinders*, Langmuir **14**, 3149 (1997).
4. D. Harries, S. May, W. M. Gelbart and A. Ben-Shaul, *Structure, stability and thermodynamics of lamellar DNA-lipid complexes*, Biophys. J. **75**, 159 (1998).
5. K. Wagner, D. Harries, S. May, V. Kahl, J.O. Raedler and A. Ben-Shaul, *Direct evidence for counterion release upon cationic lipid-DNA condensation*, Langmuir **16**, 303 (2000).
6. S. May, D. Harries and A. Ben-Shaul, *The phase behavior of cationic lipid-DNA complexes*, Biophys J. **78**, 1681-1697 (2000).
7. S. May, D. Harries and A. Ben-Shaul, *Lipid demixing and protein-protein interactions in the adsorption of charged proteins on mixed membranes*, Biophys.J. **79**, 1747-1760 (2000).
8. D. Harries, *Electrostatic interactions between macromolecules and lipid bilayers*, Ph.D. Thesis, Hebrew University (2001).
9. D. Harries, S. May, A. Ben-Shaul, *Adsorption of charged macromolecules on mixed fluid membranes*, Coll. Surf. A **208**, 41-50 (2002).
10. S. May, D. Harries, A. Ben-Shaul, *Macroion-Induced Compositional Instability of Binary Fluid Membranes*, Phys. Rev. Lett. **89**, 268102 (2002).
11. D. Harries, S. May, A. Ben-Shaul, *Curvature and Charge Modulations in Lamellar DNA-Lipid Complexes*, J. Phys. Chem. B **107**, 3624-3630 (2003).
13. R. Podgornik, D. Harries, H.H. Strey, V.A. Parsegian, *Molecular interactions in lipids, DNA, and Lipid-DNA complexes in "Gene Therapy - therapeutic mechanisms and strategies"*, N. Smyth Templeton ed., 2nd ed. (2003).
12. D. Harries, A. Ben-Shaul, I. Szleifer, *Enveloping of charged proteins by lipid bilayers*, J. Phys. Chem. B **108**, 1491-1496 (2004).

14. H.I. Petrache, S. Tristram-Nagle, K. Gawrisch, D. Harries, V.A. Parsegian, J.F. Nagle, *Structure and fluctuations of charged phosphatidylserine bilayers in the absence of salt*, Biophys. J. **86**, 1574-1586 (2004).
15. H. I. Petrache, D. Harries, V. A. Parsegian, *Alteration of lipid membrane elasticity by cholesterol and its metabolic precursors*, Macromolecular Symposia (2004, in press).
16. D. Harries, V.A. Parsegian, *Gibbs adsorption isotherm combined with Monte Carlo sampling to see the action of cosolutes on protein folding*, Proteins **57**, 311-321 (2004).
17. D. Harries, D. C. Rau, V. A. Parsegian, *Solutes probe the specific interaction of cyclodextrin and adamantane*, J. Am. Chem. Soc. (2004, accepted).

Notable press commentaries

1. *Chewing the fat about cholesterol*, Chemical and Engineering News, 82 (18) 30-31 (2004), by A. Yarnell.

Current research interests

- Using thermodynamics, statistical thermodynamics and simulations, I study of the forces that confer specificity in the interaction of biologically relevant macromolecules. In particular, I focus on the role of hydration, electrostatic and van der Waals interactions in non-polar and charged surfaces. Theoretical approaches include analytical statistical thermodynamic methods and Monte Carlo simulations. Experimental techniques include: Isothermal titration Calorimetry, Fluorimetry and Vapor Pressure Osmometry.
- Protein folding and the response to solution conditions, molecular crowding and stressing agents. Theoretical methods include Monte Carlo and Molecular Dynamic simulations and methods from solution theory. Experimentally, I use the response to osmotic pressure to probe the role of hydration in hydrophobic interactions leading to protein folding.
- Kinetics and thermodynamics of specific protein-substrate binding on the single protein channel level. The main experimental method used is measurements of ion currents through single reconstituted membrane protein channels.
- Direct measurement of forces between DNA and lipids in complexes using the osmotic stress technique combined with x-ray scattering. Theories using statistical mechanics are then used to elucidate the role of lipid and DNA material-properties in complex structure and stability.